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of novelty or originality. If so, I can but humbly acknowledge my ignorance, adding once more that this unhappy condition merely strengthens my case!

FRANCIS B. SUMNER.

ULTRA-VIOLET LIGHT IN PHOTO-MICROGRAPHY.

TO THE EDITOR OF SCIENCE: Apropos of Dr. Cleveland Abbe's letter in a recent issue of SCIENCE, I would call the attention of your readers to the fact that the developments in the use of ultra-violet light in photo-micrography with apparatus designed at Jena is described in some detail in *Engineering* (London), for December 2, 1904, page 760.

CLIFFORD RICHARDSON.

HOW DOES ANOPHELES BITE?

IN a recent number of SCIENCE Professor Washburn, in the course of some remarks on the mosquito exhibit at St. Louis, prepared by me for the New Jersey State Museum, questions the accuracy of a figure of *Anopheles* in the act of biting. I do not understand him to say positively that the figure is inaccurate, only that it had been his belief that the biting position resembled the resting position more nearly. The figure in question, which was a large colored one calculated to attract the attention of the passers-by, was intended to duplicate the picture given by Nuttall and Shipley in their work on *Anopheles*, its structure and habits. It is really a very accurate copy of their plate and the position in my chart is just exactly as published. This is an explanation, not a justification; if the figure is wrong it should not have been put on exhibition in that way; but is it wrong?

When I read Professor Washburn's note I tried to recall my own experience with *Anopheles*. I recall distinctly, watching specimens bite on several occasions, and particularly at Cape May, where *Anopheles crucians* was very plentiful in 1903 and bit freely during the early morning hours. This habit is unusual in the genus and attracted my attention, so that I gave the insects every opportunity to bite; yet, while I can recall distinctly all the surrounding circumstances, I do not recall just what position the insect assumed when biting. I questioned in turn

every member of the field and office force, and found that they were equally uncertain in the matter. All of them had been bitten and all of them were able to recall specific occasions where they watched the insect bite, yet none of them would say positively just what the biting position of the insect really was.

During the summer of 1902 Dr. Herbert P. Johnson studied *Anopheles* for me near Newark, N. J., and kept a number of the insects in confinement, allowing them to bite from time to time, and of course watching the operation. I wrote him to the St. Louis University, where he is at present engaged, and received an answer as follows: "While I have not so distinct a mental picture of the operation as I would like to possess I am very confident he [Professor Washburn] is wrong. The biting attitude he mentions would be a most extraordinary one, and for this reason: it is obvious that the mosquito pumping apparatus must penetrate the epidermis before any blood can be drawn and the epidermis is made up of many layers of cells. To thrust its lancets in obliquely is evidently to encounter more resistance, do more work, and with less prospect of success than to thrust vertically through the many layers of cells of the epidermis. If there is an easy way of doing a thing, nature does not ignore it for a more difficult way. The only way in which *Anopheles* could introduce its bill vertically and still keep it in line with its body, would be for the body to assume the vertical position, which I have never seen it do. It is always somewhat oblique."

Mr. Henry L. Viereck, who spent the entire summer at Cape May for me and who especially studied *A. crucians*, writes: "In biting *Anopheles crucians* stand like *A. punctipennis* as shown in Berkeley's figure 17; that is, with the body and beak nearly in a straight line and at an angle somewhat greater than 60° to the surface. The disposition of the legs during the act I can not recall exactly, but I feel quite sure they were very much as in the figure I have referred to."

These communications were hardly satisfactory and we looked up every reference that was available, only to find that no one who

has written upon the subject, whose works we had in hand, spoke definitely on the position of *Anopheles* in actually biting. Nuttall and Shipley describe the bending of the proboscis, and in fact the entire mechanism of biting, and other authors are almost as detailed as they; but to the position, no one seems to refer.

In the hope of getting other information I wrote to Dr. L. O. Howard, and received this reply: "I never saw *Anopheles* bite but once, and that was in the dusk while I was sitting on the platform of a railroad station at Fresno, Cal. My impression was that the beak was not in the plane of the body; but that the head was bent downward. Mr. Pratt, when he was living in Virginia, was frequently bitten by *Anopheles*, and tells me that he has a positive recollection that the head was bent downward and that the hind legs were curved upward."

I wish it distinctly understood that this is not a contribution to knowledge. It is an illustration of how many men may make observations in certain lines and absolutely ignore the most obvious points. It is also intended as a suggestion to those who may have made and recorded direct observations on this point, to publish their experiences.

JOHN B. SMITH.

RUTGERS COLLEGE,
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December 22, 1904.

SPECIAL ARTICLES.

THE DISCUSSION IN THE BRITISH PARLIAMENT ON THE METRIC BILL.

THERE lies before us a reprint from the Parliamentary Debates in the House of Lords on February 23, 1904. The order of the day was the second reading of the bill for the compulsory introduction of metric weights and measures into the United Kingdom of Great Britain and Ireland. We will make some extracts from the discussion which will show the present conditions over there and which will interest us because it is universally admitted that the adoption of the metric system by one branch of the English race will secure its adoption by the other. The reading was

moved by Lord Belhaven and Stenton, but the principal advocate of the bill was Lord Kelvin. In order to show how great change had taken place in public opinion on the measure in recent years, as compared with the time not long ago when the chief argument of the opponents of the bill was that public opinion was not yet ripe for it, the noble lord presented petitions from thirty town and city councils, representing a population of over 8,000,000, from fifty chambers of commerce, thirty retail dealers' associations, forty-three trades unions representative of 300,000 workers, sixty teachers' associations, inspectors of weights and measures in eighty districts and a large number of individual signatures, bringing the total number of individuals represented to 333,000. A nearly equal number additional were promised within a week, the Liverpool Chamber of Commerce sending theirs separately by Lord Avebury, together with several chambers of agriculture. The difficulties alleged to be experienced by foreign countries in making the change were declared non-existent. His Majesty's representatives abroad at the time stated the change was made without much difficulty; though some countries were more rapid than others, there never had been any desire to return to the old system, and the adoption of metric weights and measures had assisted the development of trade. Switzerland commenced to use the metric system eighteen months from the passing of the law. There was no great difficulty found there in the towns, but it was some time before it was adopted in remote country places. In Germany it was adopted more quickly than anywhere else. Two years and one month were allowed, and the interval thus granted was sufficient to insure the adoption of the new system in all details; it was an accomplished fact by the day named. There is no desire to go back to the old system, and the change has contributed to a rise of German trade and commerce, foreign trade deriving much benefit. There are some persons who object from a dislike to mental effort, and who prefer to muddle on with the British system described by the prime minister as 'arbitrary, perverse and utterly irrational.' To these I reply that